423-41-44

Interface Control Document Between EOSDIS Core System (ECS) and the Jet Propulsion Laboratory (JPL) Physical Oceanography Distributed Active Archive Center (PO.DAAC) for the ECS Project

December 1997

National Aeronautics and Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

INTERFACE CONTROL DOCUMENT
between
EOSDIS Core System (ECS) and the
Jet Propulsion Laboratory (JPL) Physical Oceanography Distributed Active Archive Center (PO.DAAC) for the ECS Project

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Preface

This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. This document is under ECS contractor configuration control. Once this document is approved, Contractor approved changes are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by document change notice (DCN) or by complete revision.

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Abstract

This Interface Control Document (ICD) defines the functional and physical design of each interface between ECS and the JPL PO.DAAC-Unique System and includes the data contents and format for each interface. Additionally, data rates, frequencies, file sizes, error conditions, and error handling procedures and security are included or a place holder has been inserted for updating as the information becomes available. The sequence of exchanges is described, as are the details for communications protocols or physical media for each interface. This ICD defines the functional and physical design of only certain specific external interfaces within the Jet Propulsion Laboratory (JPL) Distributed Active Archive Center (DAAC).

In particular, this ICD describes Version Ø System-to-ECS (VØ/ECS) data flows, specifically, for ingesting SeaWinds and JASON-1 data products; internetworking for VØ/ECS interoperability; and internetworking between ECS and the JPL Campus via external networks.

This ICD includes the precise data contents and format for each interface addressed in this document. State diagrams are provided which identify all states, events/conditions, error handling procedures, and security are included. Communications protocols or physical media are also addressed for each interface.

This ICD is consistent with the external systems interface requirements at the JPL PO.DAAC, as described in the Earth Science Data and Information System (ESDIS) Project -- Level 2 Requirements, the Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS level 3 requirements) and the Interface Requirements Document (IRD) Between ECS and the Version Ø System.

Keywords: active, ADEOS II, archive, ECS, DAAC, DCE, EBnet, ftp, Jason, JPL, ODL, PDR, PDRD, PO.DAAC, product delivery record, product delivery record discrepancy, production acceptance notification, PVL, SeaWinds, VØ.

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Abbreviations and Acronyms

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1. Introduction

1.1 Identification

This Interface Control Document (ICD), Contract Data Requirements List (CDRL) Item 029 whose requirements are specified in Data Item Description (DID) 209/SE1, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-60000).

1.2 Scope

This Interface Control Document (ICD) defines the external interfaces (i.e., between ECS and non-ECS components) within the Jet Propulsion Laboratory (JPL) Physical Oceanography Distributed Active Archive Center (PO.DAAC) Unique System for the ECS Release B. This ICD does not explicitly define ECS user interfaces.

ECS Releases are keyed to mission support: Pre-Release B testbed provides the functional capabilities needed to support early ESDIS Ground System Testing for the EOS AM-1 and Landsat 7 missions. Release B provides support to EOS AM-1 Mission Operations and Science Operations, and it provides support to ESDIS Ground System Certification Testing for the EOS AM-1, Landsat 7 and SAGE III missions. Release B also provides archive and distribution services for the Landsat 7 mission. Releases C & D provide evolutionary enhancements to the ECS services provided in the earlier Releases.

This ICD does not address:

a. Data flows for V0-to-V1 data migration—these data flows are fully addressed in the Version 1 Data Migration Plan White Paper, 1/95.

b. Version 0 catalog interoperability data flows; these are included in the Interface Control Document Between the EOSDIS Core System (ECS) and the Version 0 System.

The Earth Science Data and Information System (ESDIS) Project has responsibility for the development and maintenance of this ICD. Any changes in the interface requirements must be agreed to, and assessed at the ESDIS Project Level. This ICD will be approved under the signature of the ESDIS Project Manager.

This document reflects the technical baseline maintained by the ECS Configuration Control Board in accordance with ECS technical direction (see Section 2.2).

1.3 Purpose and Objectives

This document is written to formalize the interpretation and general understanding of the interfaces between ECS and non-ECS components of the JPL PO.DAAC-Unique System. This document is intended to provide clarification and elaboration of the ECS/non-ECS systems interfaces at the JPL

PO.DAAC to the extent necessary to assure hardware, software, and operational service compatibility within the end-to-end system.

This document provides a point of mutual control of external interface definitions between the ECS and the JPL PO.DAAC via the ESDIS Configuration Control Board (CCB).

1.4 Status and Schedule

This is the preliminary ICD for the ECS/non-ECS systems interfaces at the JPL PO.DAAC which will be implemented in ECS Release B. This ICD has been submitted as an ECS Project CCB approval Code 1 document. At the Government's option, this document may be designated to be under full Government CCB control. Changes may be submitted for consideration by Contractor and Government CCBs under the normal change process at any time.

Within this document are some interfaces that are yet To Be Determined (TBD), To Be Resolved (TBR), and/or To Be Supplied (TBS) items. A Work-Off Plan is included in Appendix A for resolving these items. This plan provides the following information:

a. ICD I/F Issue Number

b. ICD Reference Paragraph

c. ICD Issue Priority

d. ICD Issue Type - Description

e. Work-off Plan Task(s)

f. Projected Resolution Date

g. Risk Assessment.

1.5 Organization

Section 1 provides information regarding the identification, scope, purpose and objectives, and organization of this document.

Section 2 contains information about documentation relevant to this ICD, including parent, applicable, and information documents.

Section 3 provides an overview of the interfaces, with a brief description of the elements involved.

Section 4 provides an overview of the data exchange approaches.

Section 5 contains a description of each data exchange between the ECS and the JPL PO.DAAC-Unique System, the data transfer method, and descriptions of the data format.

Appendix A contains a table which identifies a Work-off Plan for all TBRs, TBSs and/or TBDs.

A list of abbreviations and acronyms is provided at the end of this document.

2. Related Documentation

2.1 Parent Documents

The following are parent documents from which this document's scope and content derive:

193-208-SE1-001	Methodology for Definition of External Interfaces for the ECS Project
301-CD-002-003	System Implementation Plan for the ECS Project
423-10-01-5	Goddard Space Flight Center, Earth Science Data and Information System (ESDIS) Project Level 2 Requirements, Volume 5: EOSDIS Version 0
423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)
505-10-20	Goddard Space Flight Center, System Interface Control Plan for the Earth Science Data and Information System (ESDIS) Project
505-41-11	Goddard Space Flight Center, Interface Requirements Document Between EOSDIS Core System (ECS) and the Version Ø System
423-10-33	Inter-Project Agreement between the NASA SeaWinds Scatterometer Project and ESDIS Project for Science Data Archive and Distribution Support.

2.2 Applicable Documents

The following documents are referenced herein and are directly applicable to this document. In the event of conflict between any of these documents and this ICD, this document shall take precedence. Please note that Internet links cannot be guaranteed for accuracy or currency.

206-CD-001-002	Version 0 Analysis Report for the ECS Project
505-41-31	Interface Control Document Between EOSDIS Core System (ECS) and the NASA Science Internet
540-032	Interface Control Document Between the EBnet and Distributed Active Archive Centers (DAAC)
305-CD-024-002	Release B SDPS Data Server Subsystem Design Specification for the ECS Project

305-CD-025-002	Release B SDPS Ingest Subsystem Design Specification for the ECS Project
305-CD-028-002	Release B CSMS Communications Subsystem Design Specification for the ECS Project
305-CD-029-002	Release B CSMS Management Subsystem Design Specification for the ECS Project
311-CD-008-001	Release B Science Data Processing Segment (SDPS) Database Design and Database Schema Specifications for the ECS Project
311-CD-003-005	Communications and System Management Segment (CSMS) Database Design and Database Schema Specifications for the ECS Project
313-CD-006-002	Release B SDPS/CSMS Internal Interface Control Document for the ECS Project
819-RD-001-001	EOSDIS Core System (ECS) Application Programming Interface (API) Interface Definition Document (IDD)
160-TP-002-001	Version 1 Data Migration Plan [for the ECS Project], Technical Paper
175-WP-001-001	HDF-EOS Primer for Version 1 EOSDIS (White Paper for the ECS Project)
210-TP-001-006	Technical Baseline for the ECS Project, 2/14/96
420-TP-015-001	B.0 Earth Science Data Model
420-TP-016-001	Backus-Naur Format (BNF) Representation of the B.0 Earth Science Data Model
540-032	Goddard Space Flight Center, EBnet - Distributed Active Archive Center (DAAC) Interface Control Document (ICD)
505-41-30	Goddard Space Flight Center, Interface Control Document between the EOSDIS Core System (ECS) and the Version Ø System for Interoperability.
CCSDS 641.0-B-1	Consultative Committee for Space Data Systems (CCSDS), Parameter Value Language Specification (CCSD0006), Blue Book
none	Goddard Space Flight Center, ECS Technical Direction No. 11, “PDR Technical Baseline,” 12/6/94
none	Goddard Space Flight Center, Science Data Plan for the EOS Data and Information System Covering EOSDIS Version 0 and Beyond, Document Version 3, 7/94

none	Davis, Randy; University of Colorado Laboratory for Atmospheric and Space Physics: User's Guide for the Object Description Language (ODL) Processing Software Library, Release 2.1 DRAFT, 3/13/91
none	Planetary Data System Standards Reference, Version 3.1, 8/94 (WWW access: http://stardust.jpl.nasa.gov/stdref/stdref.html)
RFC 791	Internet Protocol, J. Postel (WWW access: gopher://ds.internic. net:70/)
RFC 793	Transmission Control Protocol, J. Postel (WWW access: gopher://ds.internic.net:70/)
RFC 821	Simple Mail Transfer Protocol (SMTP)
RFC 959	File Transfer Protocol, Internet Standards, J. Postel, J. Reynolds (WWW access: gopher://ds.internic.net:70/)
RFC 1157	A Simple Network Management Protocol (SNMP), J. Case, M. Fedor, M. Schoffstall, J. Davin (WWW access: gopher://ds. internic.net:70/)

2.3 Information Documents

The following documents, although not directly applicable, amplify or clarify the information presented in this document, but are not binding.

604-CD-001-004	Operations Concept for the ECS Project: Part 1-- Overview
604-CD-002-003	Operations Concept for the ECS Project: Part 2B -- Release B

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3. Interface Overview

The Jet Propulsion Laboratory (JPL) Physical Oceanography Distributed Active Archive Center (PO.DAAC) is responsible for handling data related to physical oceanography. The goals of the Physical Oceanography Distributed Active Archive Center (PO.DAAC) are to serve the needs of the oceanographic and geophysical sciences research communities and to provide data in support of interdisciplinary research. The PO.DAAC, located at the Jet Propulsion Laboratory, is part of the Earth Observing System Data and Information System (EOSDIS). Products available from PO.DAAC are largely satellite derived. Products include: Sea-surface height, Surface-wind vector (and sigma-naught), Surface-wind speed, Surface-wind stress vector, Integrated water vapor, atmospheric liquid water, sea-surface temperature, sea-ice extent and concentration, and heat flux, and in-situ data as it pertains to satellite data. These products are derived from instruments that include: TOPEX/POSEIDON, Geos-3, Geosat, Seasat altimeters, Seasat scatterometer, NOAA AVHRR, Nimbus-7, SMMR, and DMSP SSM/I radiometers, and buoys.

3.1 ECS - JPL PO.DAAC-Unique System Overview

The ECS support for the JPL physical oceanography data is collocated with the JPL PO.DAAC-Unique System at the JPL. The ECS - JPL PO.DAAC-Unique System data exchange and user access are supported by communication/networking services through ECS and the Internet.

The ECS and the JPL PO.DAAC-Unique System work in coordination to provide user access, data archive, metadata cataloging and product distribution functions for the SeaWinds and JASON-1 data and associated value-added products in support of NASA field projects and other global change research and policy-making efforts.

3.2 ECS - JPL PO.DAAC-Unique System Interfaces

System interfaces between ECS and the JPL PO.DAAC-Unique System provide the means for transferring JPL products and for sending messages supporting data transfer. Table 3-1 provides an overview of the interfaces between ECS and the JPL PO.DAAC-Unique System for SeaWinds and JASON-1 products and associated metadata along with the information required to implement the interfaces. The interfaces listed in Table 3-1 are described within Sections 4 and 5 of this ICD to support ECS and JPL-Unique PO.DAAC design and test activities.

Table 3-1. ECS-JPL PO.DAAC-Unique System Interfaces

Source	Destination	Message	Data	Transfer Mechanism
JPL PO.DAAC-Unique System	ECS (via JPL server)	Product Delivery Record		ftp
ECS	JPL PO.DAAC-Unique System	*Product Delivery Record Discrepancy		e-mail
JPL PO.DAAC-Unique System	ECS (via JPL server)	N/A	SeaWinds Products (see Table 5-1 for details)	ftp
JPL PO.DAAC-Unique System	ECS (via JPL server)	N/A	JASON-1 MR Products (see Table 5-2 for details)	ftp
JPL PO.DAAC-Unique System	ECS (via JPL server)	N/A	JASON-1 DFA Products (see Table 5-3 for details)	ftp
ECS	JPL PO.DAAC-Unique System	Production Acceptance Notification		e-mail

*This message is used only in the event of an error in the Product Delivery Record

4. Data Exchange Framework

Section 4 describes the data exchange framework supporting the ECS - JPL PO.DAAC-Unique System interfaces presented in Section 3.2. The descriptions include network topologies, internetworking protocols, electronic data exchange, data exchange interfaces, physical media data exchange, data exchange formats and data exchange security. Section 5 describes the data flows between ECS and the JPL PO.DAAC-Unique System.

4.1 Internetworking Protocols and Network Topology

ECS provides internetworking services that are based on protocols and standards corresponding to layers 1 through 4 of the Open Systems Interconnection (OSI) Reference Model, specified in RFC 1510--these include, respectively, the physical, datalink, network, and transport layers. The transport layer protocol provides data consistency functions. The physical, datalink and network layers play significant roles in defining external interfaces (i.e., between ECS and non-ECS networks/systems). In particular, ECS routers provide the physical demarcation points between ECS networks and external networks/systems--the routing software (resident within routers) provides network layer services, while the interfaces on the router make up the physical/datalink layers.

4.1.1 Physical/Datalink Layer Protocols

At the JPL PO.DAAC the interface to the VØ DAAC LAN is via FDDI, and is implemented by a FDDI connection into an ECS DAAC router. The interface between the ECS DAAC router and other networks is specified in the EBnet Distributed Active Archive Center (DAAC) ICD.

4.1.2 Network Layer Protocols

The network layer provides the functional and procedural means to exchange network data units (i.e., packets) between devices over network connections, both for connection-mode and connectionless-mode communications. It relieves the transport layer of any concern regarding routing and relay operations associated with network connection. The basic function of the network layer is to provide the transparent transfer of data between devices. It should be noted that the network layer delivers packets only to a device, not an individual process--it remains up to the transport layer protocol to include, beforehand, the additional information needed to permit addressing to an individual process. Network layer protocols supported by ECS networks include Internet Protocol (IP) plus various routing protocols.

4.1.2.1 Internet Protocol (IP)

The Internet Protocol (IP), specified in RFC 791 is the network protocol that ECS supports, based on its dominance in industry usage and wide-community support. As part of IP support, Internet Control Message Protocol (ICMP) and Address Resolution Protocol (ARP) are also supported. As

the Internet Engineering Task Force (IETF)-specified new generation IP becomes available for deployment, it will be supported by ECS networks.

4.1.2.2 Routing

ECS generally uses Routing Information Protocol (RIP) for route exchanges with external networks. Other more robust routing protocols such as Border Gateway Protocol (BGP-4) can also be used depending on the need and center routing policies. The specific routing implementation at JPL is specified in the EBnet Distributed Active Archive Center (DAAC) ICD.

4.1.3 Transport Layer Protocol

The transport layer protocol used for communications between ECS processes and non-ECS processes at the JPL PO.DAAC is the Transmission Control Protocol (TCP) specified in RFC 793. TCP is a connection-oriented, end-to-end reliable protocol designed to fit into a layered hierarchy of protocols which support multi-network applications. It provides for reliable inter-process communication between pairs of processes in host computers attached to networks within and outside of ECS.

The interface between TCP and an application process consists of a set of calls much like the calls an operating system provides to an application process for manipulating files. For example, there are calls to open and close connections and to send and receive data on established connections. TCP can also asynchronously communicate with application programs such as those based on Distributed Computing Environment (DCE).

4.1.4 Network Topology

The VØ DAAC LAN is attached to the ECS DAAC Router via an FDDI connection as depicted in Figure 4-1. The interface between the ECS JPL PO.DAAC and other networks is currently specified in the EBnet Distributed Active Archive Center (DAAC) ICD.

4.2 Communications Protocols

ECS provides various communications services that are based on protocols and standards corresponding to the applications level of the Open Systems Interconnection (OSI) Reference Model. Services include the Simple Mail Transport Protocol (SMTP), and File Transfer Protocol (ftp).

4.2.1 Simple Mail Transport Protocol (SMTP)

All electronic mail (e-mail) message exchange is achieved through the use of Internet e-mail messages. The protocol for Internet e-mail transfer is the Simple Mail Transfer Protocol (SMTP) defined in RFC 821.

4.2.2 File Transfer Protocol (ftp)

File transfers between ECS and the JPL PO.DAAC Server are accomplished through the use of standard File Transfer Protocol (ftp). FTP, as described in RFC 959, is an internet standard for file transfers that support downloading of files, by a user (acting as a client), from a remote server.

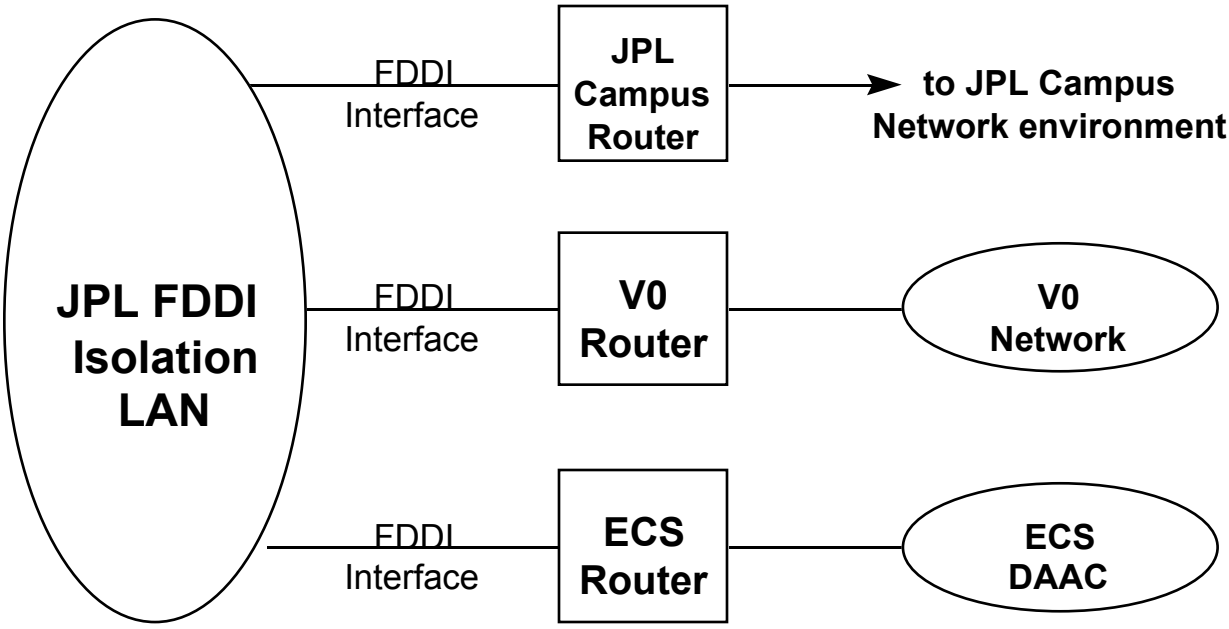


Figure 4-1. ECS - JPL PO.DAAC-Unique System Network Topology

4.3 Data Exchange Between ECS and JPL PO.DAAC-Unique System

Data exchange between the ECS and the JPL PO.DAAC consists of SeaWinds and JASON-1 Products being sent from the JPL non-ECS (VØ) system to ECS at the JPL PO.DAAC. Data transfer is accomplished through the use of ECS Polling Ingest with Product Delivery Record process, as defined in the Release B SDPS Ingest Subsystem (INS) Design Specification for the ECS Project.

4.3.1 Polling Ingest with Product Delivery Record

The purpose of the ECS/VØ System electronic interface is to support the delivery of the product data files (PDF) from the JPL VØ System to ECS at the JPL PO.DAAC. A Polling Ingest with Product Delivery Record mechanism is employed for the purpose of transferring the PDF to ECS. To accommodate this interface, a single PDR server will be identified; the product data files and the Product Delivery Records (PDRs) will be placed on this PDR Server by the JPL VØ System. At

the end of this data exchange, JPL will clean the Server disk of the PDR and product data files. This implementation of the Polling Ingest with PDR consists of the following steps (see Figure 4-2):

(1) The JPL VØ System places the product data files (PDF) on the PDR Server in a specified location -

(2) The JPL VØ System generates a PDR; places the PDR on the PDR Server in a known directory -

(3) With operator tunable periodicity, ECS polls the directory on the PDR Server, and detects/ retrieves the PDR -
The ECS side of the interface is equipped with an ftp daemon---a computer program which automatically, and with operator-tunable periodicity, polls the PDR Server, detects a PDR file via a ftp "-ls" command, and acquires the PDR file information via a ftp "get" command (note: see section 4.3.6 for security aspects). At the PDR Server, an ftp daemon continually listens for incoming ftp requests, acts on each arriving ftp request, and routes each ftp request to the appropriate account, making the directory sub-tree available to ECS with the allowable privileges.

(4) ECS sends Product Delivery Record Discrepancy (PDRD) to JPL VØ System (via e-mail) indicating errors found in PDR -
Once a PDR has been detected/acquired by ECS, the PDR is validated. In the event that the PDR is invalid, ECS automatically returns a Product Delivery Record Discrepancy (PDRD), via e-mail, to the supplier system. If the PDR is valid, ECS schedules to pull the product data files (PDF) and reports using an ftp "get" command; in this case no PDRD is sent. If an error is detected in the PDR, processing is terminated and none of its files are transferred to the ECS server for processing until a corrected PDR is received and successfully processed.

(5) ECS pulls the PDF from the PDR Server to be ingested. The PDF is then archived.

(6) ECS sends a Production Acceptance Notification (PAN) to the JPL VØ System (via e-mail) indicating either success or errors found.

Operator tunable parameters for the transfer of the PDR, PDRD and PAN include the time between ECS Ingest receiving a failure and sending a new PDRD/PAN, and the JPL VØ System waits to receive a PDRD (or PAN) before placing another PDR in the directory on the PDR Server. All relevant operator tunable parameters will be documented in the operations procedures for the JPL VØ Systems and ECS as an integral part of the PO.DAAC Operations Manual (e.g., DID 611).

The Polling Ingest with PDR transfer mechanism is fully automated. In the context of this transfer mechanism, this section addresses the PDR, PDRD and PAN. In addition, the error conditions, error handling/backup methods, and physical media are discussed herein.

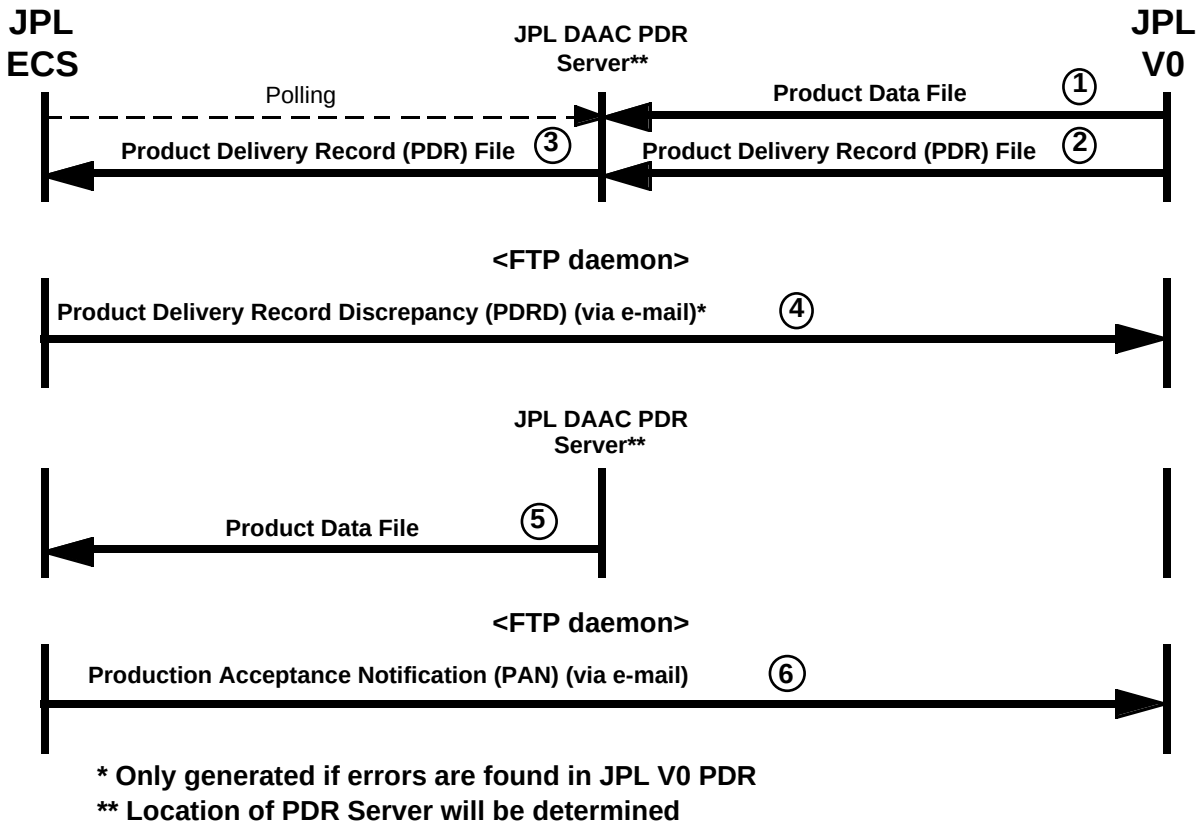


Figure 4-2. ECS - JPL PO.DAAC-Unique Product Data File Transfer Mechanism

4.3.2 Product Delivery Record (PDR)

The purpose of the PDR is to announce the availability of product data files for transfer, including file names, file size, location, etc. The PDR is generated and placed in a pre-specified directory on the PDR Server by the system supplying the data (i.e., the JPL VØ System) after the product data files referenced in the PDR have been placed into their respective directories. Both the server and the directory are operator configurable parameters. ECS polls the PDR Server, detects/acquires/validates the PDR, and schedules to pull the data.

The PDR format is comprised of Parameter-Value Language (PVL) Statements. The required PDR PVL parameters are depicted in Table 4-1. The PDR PVL statements are ASCII strings, having at most 256 characters, in the form: "Parameter = Value." The Value strings shown in Table 4-1 include pre-defined values shown by single quote marks and processor determined values which include ASCII strings, International Standards Organization (ISO) times, and integers to be filled in with appropriate values by an JPL VØ System processor during PDR creation. An example PDR PVL for product data files is provided in Figure 4-3. The maximum allowed message length for a PDR is 1 megabyte. PDRs are validated to check that all required fields contain valid values

and that the format of the PDR is correct and consistent with the standards. PDRs that adhere to the defined message standards shown in Table 4-1 are accepted and processed. Additional information on PVL valid characters can be found in the document entitled, "Consultative Committee for Space Data Systems (CCSDS), Parameter Value Language Specification (CCSD0006), Blue Book." Using the file naming convention depicted in Table 4-2, unique file names (time-based) are assigned to each PDR, so as to avoid potential overwrites (an example PDR File Naming Convention is depicted in Figure 4-4).

It is important to note that a FILE_GROUP consists of all files of one DATA_TYPE that compose a granule. (A granule is the smallest aggregation of data that can be inventoried within ECS and ordered from ECS.) All files within a FILE_GROUP are stored together in the ECS archive.

Table 4-1. PDR PVL Parameters (1 of 2)

Parameter	Description	Type	Format/ Max Size (Bytes)	Values
ORIGINATING_SYSTEM	Originator of Delivery Record	Variable String	ASCII (20)	JPL Processor Identifier (Note 1)
TOTAL_FILE_COUNT	Total number of files to transfer	Integer	ASCII (4)	1 - 9999
EXPIRATION_TIME (Note 2)	ISO Time for data deletion from originating system. This time is set by JPL VØ system based on available resources.	Fixed String	ASCII (20)	GMT in for the format: yyyy-mm-ddThh:mm:ssZ, where T indicates the start of time information and Z indicates "Zulu" time. (operations tunable amount of time after PDR sent)
OBJECT	Start of file group parameters (repeat for each group of files).	Fixed String	ASCII (10)	'FILE_GROUP'
DATA_TYPE	Valid ECS Data Type	Fixed String	ASCII (8)	Valid ESDT shortname (e.g., SWS-L1A, SWS-L1B, SWS-L2A, SWS-L2B, MR-SDR, DFA01, DFA02A, DFA02B, DFA03)
NODE_NAME	Name of network node on which the file resides	Variable String	ASCII (64)	e.g., 'calibsrv.nasa.gov'
OBJECT	Start of file parameters (repeat for each file in file group)	Fixed String	ASCII (9)	'FILE_SPEC'
DIRECTORY_ID	File directory name (i.e. path name)	Variable String	ASCII (Note 3)	e.g., /JPL1/CAL1/
FILE_ID	File name	Variable String	ASCII (Note 4)	JPL file name (per JPL Data/Metadata File Definition)
FILE_TYPE	File Data Type	Variable String	ASCII (20)	e.g., 'metadata', 'science'

Table 4-1. PDR PVL Parameters (2 of 2)

Parameter	Description	Type	Format/ Max Size (Bytes)	Values
FILE_SIZE	Length of file in bytes	Unsigned 32-bit Integer	ASCII (10)	< 2 GB
END_OBJECT	End of file parameters (repeat for each file)	Fixed String	ASCII (9)	'FILE_SPEC'
END_OBJECT	End of file group (repeat for each group of files)	Fixed String	ASCII (10)	'FILE_GROUP'

Note 1. Used in PAN & PDRD to identify JPL VØ System response.
Note 2. Only used when PDR server is not under ECS control.
Note 3. Size can vary up to 256 bytes total when DIRECTORY_ID is combined with FILE_ID.
Note 4. Size can vary up to 256 bytes total when FILE_ID is combined with DIRECTORY_ID.

EXAMPLE ONLY **EXAMPLE ONLY**

```
ORIGINATING_SYSTEM = JPL1234;  /* Data Processor Identifier */
TOTAL_FILE_COUNT = 2;
EXPIRATION_TIME = 1996-06-23T09:46:35Z;
OBJECT = FILE_GROUP;
        DATA_TYPE = SWS-L1A;  /* ECS data types defined by ECS */
        NODE_NAME = calibsrv.nasa.gov;
        OBJECT = FILE_SPEC;
                DIRECTORY_ID = JPL1/CAL1/;
                FILE_ID = JPLCALP.01A;   /* '01' = File #, 'A' = Version */
                FILE_TYPE = SCIENCE;  /* ECS file types defined by ECS */
                FILE_SIZE = 1000000;
        END_OBJECT = FILE_SPEC;
        OBJECT = FILE_SPEC;
                DIRECTORY_ID = JPL1/CAL2/;
                FILE_ID = JPLCALP.02A;
                FILE_TYPE = METADATA;  /* Allowed values pre-defined by ECS */
                FILE_SIZE = 1000000;
        END_OBJECT = FILE_SPEC;
        ------------------------------------------------------------------------------
        /* Repeat FILE_SPEC objects for each JPL data file within file group */
        ------------------------------------------------------------------------------
END_OBJECT = FILE_GROUP;
        ------------------------------------------------------------------------------
        /* Repeat FILE_GROUP objects for each different file group */
        ------------------------------------------------------------------------------
```

Figure 4-3. Example PDR PVL

Table 4-2. File Naming Convention For Product Delivery Record

Field	Description	Format/ Type Max Size (Bytes)	Value
JPL Designation	Designation for JPL	ASCII String (20)	Originating System in PDR
PDR Creation Date	Date when PDR was created	ASCII (14)	yyyymmddhhmmss
Filename extension	Extension for file PDR filename	ASCII String (3)	'PDR'

EXAMPLE ONLY EXAMPLE ONLY

FILENAME = JPL123.yyyymmddhhmmss.PDR,

where

yyyymmddhhmmss = date = 20010719123845,

Figure 4-4. Example PDR File Naming Convention

4.3.3 Product Delivery Record Discrepancy (PDRD)

The Product Delivery Record Discrepancy (PDRD) is sent by ECS to the supplier system (i.e., JPL VØ System), via automatic e-mail, only in the event that the PDR cannot be successfully validated. The PDRD identifies the error/success dispositions for file groups in the PDR resulting from ECS's attempt to validate the PDR. The file naming convention for the PDRD will follow the name of the appropriate PDR except that the PDRD will have an extension of .PDRD. When the PDRD is sent as an e-mail message, the subject of the message will be the PDRD file name. There are two forms of PDRD, including a short form (Table 4-3) and long form (Table 4-4). The short form is used for a PDR when the first error encountered in each file group within the PDR is the same or the first error found applies to each group. The long form is used when one or more file groups in the PDR have invalid parameters; some file groups may be error-free. For each file group, if an error is encountered, ECS halts processing and reports the error which it just encountered for that file group. All remaining conditions in that file group are not validated. ECS processing then continues on with the next file group in the PDR. The dispositions in the Long PDRD will be reported for all file groups in the order listed in the PDR. In the event that a PDRD is returned to the JPL VØ System, none of the files are transferred to the ECS for processing, and the JPL VØ System must correct the errors and resubmit the entire PDR for processing. The PDRD consists of PVL Statements. Short and Long PDRD PVL examples are provided, respectively, in Figure 4-5 and Figure 4-6.

Table 4-3. Short Product Delivery Record Discrepancy PVL Parameters

Parameter[2]	Description	Type/Format (Length in Bytes)	Value[2]
MESSAGE_TYPE	Short Product Delivery Record Discrepancy	Fixed String/ASCII (9)	SHORTPDRD
DISPOSITION	Disposition of Ingest Request[1]	Variable String/ASCII (64)	One of the following: "INVALID FILE COUNT" "ECS INTERNAL ERROR" "DATABASE FAILURES" "INVALID PVL STATEMENT" "MISSING OR INVALID ORIGINATING_SYSTEM PARAMETER" "DATA PROVIDER REQUEST THRESHOLD EXCEEDED" "DATA PROVIDER VOLUME THRESHOLD EXCEEDED" "SYSTEM REQUEST THRESHOLD EXCEEDED" "SYSTEM VOLUME THRESHOLD EXCEEDED"

Note 1. In any given instance, only one disposition value is provided. In cases where multiple errors may exist, the disposition value corresponding to the first error encountered will be provided.
Note 2. Each parameter/value is followed by an EOL mark.

EXAMPLE ONLY **EXAMPLE ONLY**

MESSAGE TYPE = SHORTPDRD;
DISPOSITION = "DATABASE FAILURES";

Figure 4-5. Example Short PDRD PVL

Table 4-4. Long Product Delivery Record Discrepancy PVL Parameters

Parameter[2]	Description	Type/Format (Length in Bytes)	Value[2]
MESSAGE_TYPE	Long Product Delivery Record Discrepancy	Fixed String/ASCII (8)	LONGPDRD
NO_FILE_GRPS (to follow)	Number of File Groups in the PDR	Integer/ASCII (4)	Number of File Groups in the PDR
For each file group in the PDR			
DATA_TYPE	ECS Data Type	ASCII String (20)	DATA_TYPE in PDR
DISPOSITION	Disposition of Ingest Request[1]	Variable String/ASCII (64)	One of the following: "SUCCESSFUL" "INVALID DATA TYPE" * "INVALID DIRECTORY" * "INVALID FILE SIZE" "INVALID FILE ID" * "INVALID NODE NAME" * "INVALID FILE TYPE" *

Note 1. For each file group, only one disposition value may be provided. In cases where multiple errors may exist, the disposition value corresponding to the first error encountered will be provided.
Note 2. Each parameter/value statement is followed by an EOL mark.
* Null string check only

EXAMPLE ONLY **EXAMPLE ONLY**

```
MESSAGE_TYPE = LONGPDRD;
NO_FILE_GRPS = 3;
DATA_TYPE = JPL_DATA1;
DISPOSITION = "INVALID DATA TYPE";
DATA_TYPE = JPL_DATA2;
DISPOSITION = "INVALID FILE ID";
DATA_TYPE = JPL_DATA3;
DISPOSITION = "SUCCESSFUL";
```

Figure 4-6. Example Long PDRD PVL

4.3.4 Production Acceptance Notification (PAN)

After the data have been ingested/archived by ECS, ECS automatically sends a "Production Acceptance Notification (PAN)" via e-mail to the supplier system (i.e., JPL VØ System). The PAN file announces the completion of data transfer and archival, and identifies any errors or problems that have been encountered. The file naming convention for the PAN will follow the name of the appropriate PDR except that the PAN will have an extension of .PAN. When the PAN is sent as an e-mail message, the subject of the message will be the PAN file name. There are two forms of the PAN available for use, including a short (Table 4-5) and a long (Table 4-6) form. The short form of the PAN is sent to acknowledge that all files have been successfully transferred, or to

report errors which are not specific to individual files but which have precluded processing of any and all files (e.g., ftp failure). If all files in a request do not have the same disposition, a long form of this message is employed. For each file in a file group, if an error is encountered, ECS halts processing and reports the error which it just encountered for that file. All remaining conditions in that file are not validated. ECS processing then continues on with the next file in the file group. If there are no more files to process in the file group, ECS processing then continues on with the next file group in the PDR. The PAN consists of PVL Statements. Short and Long PAN PVL examples are provided, respectively, in Figure 4-7 and Figure 4-8.

Table 4-5. Short Production Acceptance Notification PVL Parameters

Parameter[2]	Description	Type/Format (Length in Bytes)	Value[2]
MESSAGE_TYPE	Short Production Acceptance Notification Definition	Fixed String/ASCII (8)	SHORTPAN
DISPOSITION	Disposition of Ingest Request[1]	Variable String/ASCII (64)	One of the following: "SUCCESSFUL" "NETWORK FAILURE" "UNABLE TO ESTABLISH FTP/KFTP CONNECTION" "ALL FILE GROUPS/FILES NOT FOUND" "FTP/KFTP FAILURE" "POST-TRANSFER FILE SIZE CHECK FAILURE" "FTP/KFTP COMMAND FAILURE" "DUPLICATE FILE NAME IN GRANULE" "METADATA PREPROCESSING ERROR" "RESOURCE ALLOCATION FAILURE" "ECS INTERNAL ERROR" "DATA BASE ACCESS ERROR" "INCORRECT NUMBER OF METADATA FILES" "INCORRECT NUMBER OF SCIENCE FILES" "INCORRECT NUMBER OF FILES" "DATA CONVERSION FAILURE" "REQUEST CANCELED" "UNKNOWN DATA TYPE" "INVALID OR MISSING FILE TYPE" "FILE I/O ERROR" "DATA ARCHIVE ERROR"
TIME_STAMP	ISO Time when Destination System transferred the last part of data	ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ, where T indicates the start of time information and Z indicates "Zulu" time (Null if disposition is not "SUCCESSFUL")

Note 1. In any given instance, only one disposition value may be provided. In cases where multiple errors have occurred, the disposition value corresponding to the first error encountered will be provided.
Note 2. Each parameter/value statement is followed by an EOL mark.

EXAMPLE ONLY **EXAMPLE ONLY**

```
MESSAGE_TYPE = SHORTPAN;
DISPOSITION = "POST-TRANSFER FILE SIZE CHECK FAILURE";
TIME_STAMP = 1996-06-23T09:46:35Z;
```

Figure 4-7. Example Short PAN PVL

Table 4-6. Long Production Acceptance Notification PVL Parameters

Parameter[2]	Description	Type/Format (Length in Bytes)	Value[2]
MESSAGE_TYPE	Long Production Acceptance Notification	Fixed String/ASCII (7)	LONGPAN
NO_OF_FILES	Number of Files in PDR	ASCII (4)	TOTAL_FILE_COUNT parameter in PDR
For each File in the PDR			
FILE_DIRECTORY	ASCII string specifying file directory location	ASCII (<256) Equivalent to PDR length	DIRECTORY_ID parameter in PDR
FILE_NAME	File names on system creating PDR	ASCII (<256) Equivalent to PDR length	FILE_ID parameter in PDR
DISPOSITION	Disposition of Ingest Request[1]	Variable String/ASCII (64)	One of the following: "SUCCESSFUL" "NETWORK FAILURE" "UNABLE TO ESTABLISH FTP/KFTP CONNECTION" "ALL FILE GROUPS/FILES NOT FOUND" "FTP/KFTP FAILURE" "POST-TRANSFER FILE SIZE CHECK FAILURE" "FTP/KFTP COMMAND FAILURE" "DUPLICATE FILE NAME IN GRANULE" "METADATA PREPROCESSING ERROR" "RESOURCE ALLOCATION FAILURE" "ECS INTERNAL ERROR" "DATA BASE ACCESS ERROR" "INCORRECT NUMBER OF METADATA FILES" "INCORRECT NUMBER OF SCIENCE FILES" "INCORRECT NUMBER OF FILES" "DATA CONVERSION FAILURE" "REQUEST CANCELED" "UNKNOWN DATA TYPE" "INVALID OR MISSING FILE TYPE" "FILE I/O ERROR" "DATA ARCHIVE ERROR"
TIME_STAMP	ISO Time when Destination System transferred the last part of the data	ASCII (20)	GMT in the format: yyyy-mm-ddThh:mm:ssZ, where T indicates the start of time information and Z indicates "Zulu" time. (Null if disposition is not "SUCCESSFUL")

Note 1. In any given instance, only one disposition value may be provided. In cases where multiple errors have occurred, the disposition value corresponding to the first error encountered will be provided.
Note 2. Each parameter/value statement is followed by an EOL mark.

4.3.5 ECS - JPL VØ System Electronic Data Exchange Error Handling/Back-up Methods

Exchange of data on physical media is used for data transfer back-up. ECS provides hard media ingest as described in the Release B SDPS Ingest Subsystem (INS) Design Specification for the ECS Project. The hard media received by ECS must provide information describing the data being transferred. This information is provided in standard PVL form, and relates the same information as provided in the PDR used with the Polling Ingest with PDR process.

EXAMPLE ONLY **EXAMPLE ONLY**

```
MESSAGE_TYPE = LONGPAN;
NO_OF_FILES = 3;
FILE_DIRECTORY = JPL1/CAL1;
FILE_NAME =JPLCALP.01A;
DISPOSITION = “UNABLE TO ESTABLISH FTP/KFTP CONNECTION”;
TIME_STAMP = 1996-04-28T23:49:59Z;
FILE_DIRECTORY = JPL1/CAL2;
FILE_NAME =JPLCALP.02A;
DISPOSITION = “ECS INTERNAL ERROR”;
TIME_STAMP = 1996-04-28T23:54:59Z;
FILE_DIRECTORY = JPL1/CAL2;
FILE_NAME =JPLCALP.03A;
DISPOSITION = “SUCCESSFUL”;
TIME_STAMP = 1996-04-28T23:59:59Z;
```

Figure 4-8. Example Long PAN PVL

During the course of data exchange via ftp, the following typical error conditions may arise:

- Failure to establish TCP/IP connection
- Erroneous ftp command
- File not found (listed in PDR, but not found on disk)
- File not readable due to permissions

Should a problem develop during an ftp file transfer due to any of the above error conditions, an operator-tunable number of attempts are made to pull the data. In the event that problems cannot be resolved within this operator-tunable number of attempts, ECS and the JPL VØ System operations personnel have the option to coordinate data delivery on a variety of approved high density storage media including the following:

a. 8 mm tape [112 meters; 5GB standard capacity]

b. 4 mm digital audio tape (DAT) [90 meters; 2GB standard capacity]

While the use of tape media as a backup may not be a requirement, it may be useful during emergencies, and is supported by both ECS and the JPL VØ System. Physical media tapes are to be sent to the ECS from the JPL VØ System. ECS ingests and archives the JPL data delivered on physical media received in good condition. In the event that tape media are used during emergencies, a separate Physical Media Product Delivery Record (PMPDR) file must be supplied for each piece of media delivered to ECS. The PMPDR must, both be contained as a file on the media, and be available separately as hard copy--in the event that a file check on the media by ECS reveals that the PMPDR is missing, JPL VØ System operations personnel will supply ECS

operations personnel with a hard copy PMPDR. The format and information content for the PMPDR is the same as that for the PDR defined in Table 4-1.

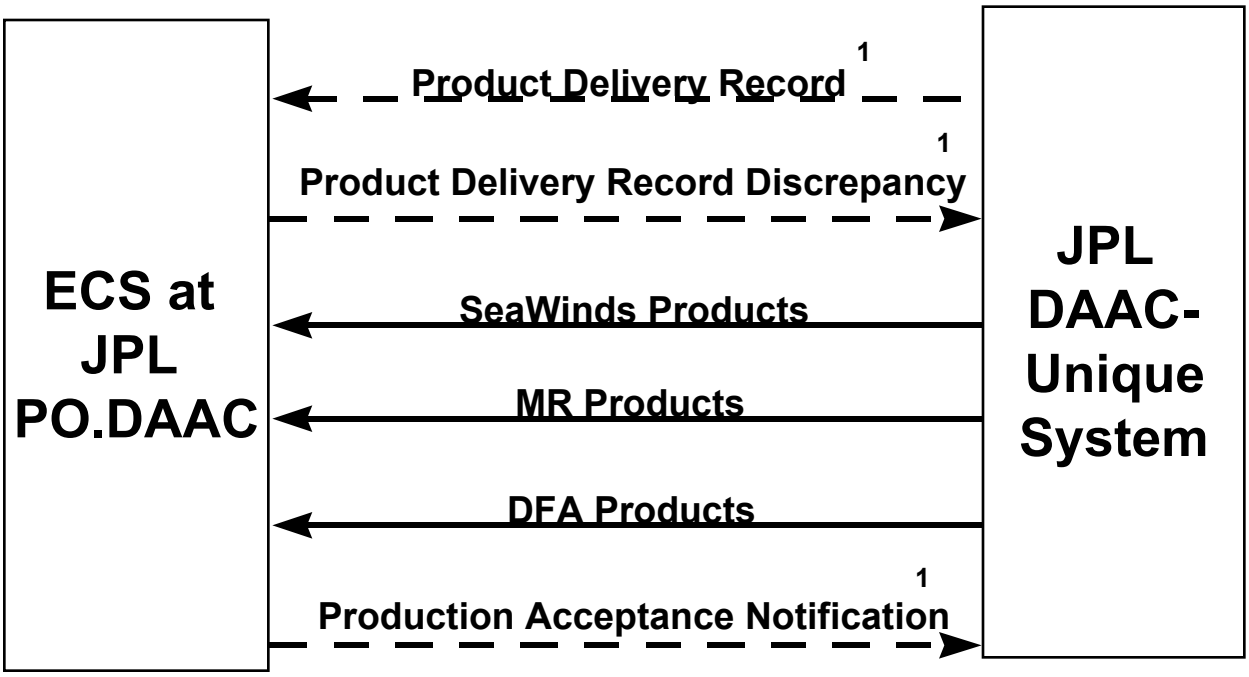
ECS expects to receive the data uncompressed. The TAR tape format is used---no absolute path is used when creating the TAR file. The PMPDR file must be either available on the PMPDR packing list delivered with the tape or have file extension .PDR. The Directory ID is optional on the PMPDR. Subdirectories can be used within the TAR file, as long as the Directory ID is provided in the PMPDR. Paper labels for each tape identify the names of files contained on the tape and the order in which these files have been written---the use of bar code labeling is optional.

4.3.6 ECS - JPL VØ System Electronic Data Exchange Security

Any applications in which ECS is polling the JPL VØ System's disk, standard ftp login procedures including the use of a password for the purposes of security is used. User IDs and passwords are needed for ftp connections and are maintained by ECS. It is recommended that User IDs and passwords be changed, via the PO.DAAC administrator, periodically (on the order of every six months) or whenever a system compromise is suspected.

5. Data Flow Descriptions

Figure 5-1 identifies the data flows between the ECS and the JPL PO.DAAC-Unique System. Descriptions of the data exchange framework supporting these flows are found in Section 4 of this ICD. Each data flow shown in Figure 5-1 is described in this section. A description of each interface is provided. The direction of data flow is indicated. And if appropriate, the object classes that support an interface are identified along with a pointer to where design detail on the object class can be found.



Note 1: Defined in Section 4

Figure 5-1. Data Flows Between ECS and JPL PO.DAAC-Unique System

5.1 SeaWinds Product Data Sets

The JPL PO.DAAC-Unique System provides SeaWinds Product Data sets from ADEOS-II to ECS for archive and distribution.

File ID (ESDT short name)	Instrument	File Name	SPSO Equivalent	File Size (MB)
Archived within ECS				
SWS-L1A	SWS	Convert Telemetry - Level 1a processing of Level 0 Rev data	N/A	9.9
SWS-L1B	SWS	Level 1B Backscatter Power Calculation	SWS01 (2108)	66.8
SWS-L2A	SWS	Level-2A' Backscatter Cross-Section (Sigma 0)	SWS02 (3721)	97.0
SWS-L2B	SWS	Level 2B Wind Vectors, Near Surface	SWS03 (1680)	3.5

Table 5-1. SeaWinds Product Data sets

5.2 JASON-1 MR Product Data Sets

The JPL PO.DAAC-Unique System provides JASON-1 MR Product Data sets from JASON-1 to ECS for archive and distribution.

File ID (ESDT short name)	Instrument	File Name	SPSO Equivalent	File Size (MB)
Archived within ECS				
MR-SDR	JASON-1 MR	MR Science Data Record	n/a	0.1

Table 5-2. JASON-1 MR Product Data sets

5.3 JASON-1 DFA Product Data Sets

The JPL PO.DAAC-Unique System provides JASON-1 DFA Product Data sets from JASON-1 to ECS for archive and distribution.

File ID (ESDT short name)	Instrument	File Name	SPSO Equivalent	File Size (MB)
Archived within ECS				
DFA01	JASON-1 DFA	Level 1B Science Data Rec	3464	6.0
DFA02A	JASON-1 DFA	DFA Level 2a IGDR Interim Geophysical Science Data Record	3756a,3129,31112a,	0.6
DFA02B	JASON-1 DFA	DFA Level2b GDR Geophysical Science Data Record	3756b,3129b,31112b,1735b	0.6
DFA03	JASON-1 DFA	Level 3 Sea Surface Topography Map	3108	1.0

Table 5-3. JASON-1 DFA Product Data sets

Appendix A.
Work-off Plan for Release B ECS-JPL PO.DAAC ICD

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Abbreviations and Acronyms

ADEOS II	Advanced Earth Observing System
CCB	Configuration Control Board
CCR	Configuration Change Request
CCSDS	Consultative Committee for Space Data Systems
CDRL	Contract Data Requirements List
CSMS	Communications and System Management Segment
DAAC	Distributed Active Archive Center
DCE	Distributed Computing Environment
DCN	Document Change Notice
EBnet	Ethernet Backbone Network
ECS	EOSDIS Core System
EOL	end of line
EOS	Earth Observing System
EOSDIS	EOS Data and Information System
ESDIS	Earth Science Data and Information System
FDDI	Fiber Distributed Data Interface
ftp	File Transfer Protocol
HDF-EOS	Hierarchical Data Format - Earth Observing System
HTTP	Hypertext Transfer Protocol
I&T	integration and test
I/F	interface
ICD	Interface Control Document
IP	Internet Protocol
IPA	Inter-Project Agreement
IRD	Interface Requirements Document
ISO	International Standards Organization

JPL	Jet Propulsion Laboratory
Kftp	Kerberos File Transfer Protocol
LAN	Local Area Network
MB	Megabyte (10^6 bytes)
N/A	Not Applicable
NASA	National Aeronautics & Space Administration
ODL	Object Description Language
OODCE	Object Oriented Distributed Computing Environment
OSF	Open System Foundation
PAN	Production Acceptance Notification
PDF	Product Data File
PDR	Product Delivery Record
PDRD	Product Delivery Record Discrepancy
PVL	Parameter Value Language
RPC	Remote Procedure Call
SDPS	Science Data Processing Segment
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
TBD	To Be Determined
TBR	To Be Reviewed, To Be Resolved
TBS	To Be Supplied
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
VØ	Version Ø
V1	Version 1